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REPORT OF TWO CASES.

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**THE AMEBA COLI: ITS IMPORTANCE IN
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THE REPORT OF TWO CASES.¹**

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SINCE the first observation, by Osler,² in this country of the ameba coli in the pus of an hepatic abscess, occurring in a man with chronic dysentery, it has been found by several observers in the stools of patients with both acute and chronic dysentery and in the pus of liver-abscesses complicating the disease.

That the form of dysentery associated with the presence of this organism is frequent in this country is proved by the numerous cases that have been reported from widely-separated localities: the cases of Dock,³ in Texas; those of Stengel,⁴ in Philadelphia; those of Councilman and Lafleur,⁵ in Baltimore, and the case of Eichberg,⁶ in Cincinnati.

¹ Read at the Semi-annual Meeting of the Medical and Surgical Faculty of Maryland, at Easton, November 15, 1892.

² Osler: Johns Hopkins Hospital Bulletin, vol. i, No. 5, 1890.

³ Dock: Texas Medical Journal, April, 1891.

⁴ Stengel: Medical News, November 15, 1890.

⁵ Councilman and Lafleur: Johns Hopkins Hospital Reports, vol. ii, 1891.

⁶ Eichberg: Medical News, August 22, 1891.



The admirable contribution to our knowledge of the relation of the ameba coli to a certain distinct form of dysentery and its complications, recently made by Councilman and Lafleur, has shed much light upon the diagnosis and prognosis of the disease, as well as upon its etiology and pathologic anatomy. Their work has given added interest and importance to the recognition and study of this disease.

The first case of dysentery in which amebæ coli were found and their presence thought to hold a causal relation to the disease was that of Lösch, quoted by Councilman and Lafleur. Lösch gave a good description both of the lesions and of the organisms. Koch and others, quoted by Councilman and Lafleur, found them in intestinal ulcers and in liver-abscesses occurring in patients with dysentery. Kartulis has studied the ameba coli in the same lesions in the dysentery of Egypt. This observer has made important contributions to the literature of the subject, and has given clear descriptions of the organism. Councilman and Lafleur, however, were the first to work out in an exhaustive manner the lesions of the dysentery associated with the ameba coli from the clinical, etiologic, and anatomic standpoints. These observers studied, clinically and anatomically, fifteen cases of the disease under consideration in the Johns Hopkins Hospital and in Baltimore, and have shown that the affection is identical with the so-called tropical dysentery. Their description of the organism agrees with those of Lösch, Kartulis, and Osler.

The shape of the ameba coli when inactive is round or oblong, but when active it is of irregular outline. In size it varies from ten to twenty micromillimeters in diameter. It has an ectosarc and an endosarc, more clearly seen in the active forms. In the resting state the amebæ are more highly refractive. The ectosarc is composed of a pale, homogeneous, hyaline substance; the endosarc is refractive, and contains vacuoles of varying size.

In some a more or less definite nucleus can be made out. Amebæ coli present two varieties of motion, a progressive motion, by which they change their place, and another motion consisting in the putting out and retracting of pseudopodia. The latter is the more frequent and characteristic motion. The activity and frequency of these movements vary greatly, and are influenced by a variety of conditions. They are most active at the body-temperature, and become slower and cease when the organisms are exposed to heat or cold, and various chemical agents. These pseudopodia are always rounded or blunt at the end; they vary much in size, and may form long, straight, or irregular projections. An ameba may change its position by putting forth a large pseudopodium into which its contents rapidly pour.

These amebæ often contain various foreign bodies, such as red blood-corpuscles, pus-cells, the nuclei of cells, and bacteria. These elements lie usually in the center of the organism.

Councilman and Lafleur succeeded in staining the amebæ coli with various dyes, both after drying

them on cover-slips and after hardening them in the tissues in different preserving fluids. Very good results were obtained after hardening in alcohol, and staining in methylene-blue. The central portion stains irregularly, and numerous fine granules, not unlike micrococci, are seen.

The following two cases show the practical diagnostic and prognostic importance of searching for and finding the amebæ coli in the stools and in the expectoration :

CASE I.—A. P., a Russian Pole, twenty-eight years of age, married, was admitted to our service at St. Joseph's Hospital, April 12, 1892, complaining of weakness and frequent stools, accompanied by tenesmus and abdominal pain. His family history was negative. He had always been healthy, except for an attack of malarial fever several years ago. His present illness began three weeks ago while at work at Sparrow's Point, Md. After a hard day's work he drank a great deal of ice-water, and the next day was attacked with severe abdominal cramps and a profuse diarrhea. He left Sparrow's Point after a few days, and went to Curtis Bay, Md. There he improved for a time, but eight days later he was again attacked with abdominal cramps and a copious diarrhea. A great deal of pain accompanied the stools, which numbered about fifteen in the twenty-four hours, were blood-stained, and at times contained shreds of "membrane." On admission the following note was made: His frame large, body emaciated, skin sallow, expression anxious, and he looks ill. The lips are pale, the tongue moist, and covered with a heavy white fur. The temperature is 100°, pulse 80, of fair volume; the respirations are 24, unembarrassed. The chest is well formed, the

costal angle broad, expansion equal. The percussion-note is hyper-resonant posteriorly. On both sides, on auscultation, there are sonorous and sibilant râles, and prolonged expiration. These sounds are best marked posteriorly. Cardiac dulness begins at the fourth rib. The apex-beat is in the fifth intercostal space, in the nipple line. The heart-sounds are heard over a large area at the apex ; they are moderately loud, and are clear at both apex and base. The liver-dulness begins at the sixth rib in the mammary line, and extends to a distance of 1 cm. below the costal margin. The liver-dulness is not apparently increased behind. The lower border is palpable. The spleen is negative. The abdomen is flat and retracted. It is resonant everywhere. There is distinct tenderness to pressure along the line of the descending colon and at the hepatic flexure of the colon. There is distinct tenderness to pressure along the line of the descending colon and at the hepatic flexure of the colon. There is no mass felt anywhere.

On April 14th : The patient had had twenty stools since the preceding day. There was profuse sweating of the forehead, head, face and back. Temperature 100°, pulse 108, and slightly dicrotic, the respirations 28, natural. The patient appeared to suffer no special pain. Just below the liver-margin there was slight tenderness on pressure. There was some tenderness on pressure in the right iliac fossa, where there was also also resonance over a small area. The abdominal wall was somewhat resistant here. There was no special tenderness over McBurney's point. Just above Poupart's ligament there was a small area, where, on deep percussion, a loud resonant tympany was elicited.

The appearance of the stools was suggestive of amebic dysentery. The stools were copious, and

had a very offensive odor. They were quite fluid, and in general of a grayish color, with brownish-red streaks of blood-stained material and yellowish-gray necrotic looking masses, and also other grayish gelatinous-looking masses.

On microscopic examination of a fresh stool there were seen numerous red blood corpuscles, leukocytes, and large oval epithelioid cells in great numbers. There were also cylindrical epithelial cells to be seen. There were numerous bacteria, a few elastic fibers, and a great deal of granular detritus. Numerous actively moving amebæ, of the size and appearance of the amebæ coli, were observed. These amebæ were generally in quite active motion, sending out large pseudopodia with great frequency. The central portion of the amebæ was very refractive, and filled with granular detritus. The material in the pseudopodia was of a steel-gray color, and hyaline and translucent. The amebæ seen contained one or several vacuoles. Examination of the urine was negative.

On April 15th the general condition was about the same. The stools were unchanged in number and in general character. There was tenderness on pressure over the whole abdomen, not limited to the line of the colon. Over the region of the cecum and in the whole of the iliac region there was marked tenderness on deep pressure. The Skodaic tympany noticed on the 12th instant had disappeared. The liver-area was not further increased, the spleen negative. He had several times vomited a watery, mild-colored fluid during the day.

On April 20th the condition of the patient had grown steadily worse. For the last three days he had vomited at frequent intervals. The stools varied from twenty to thirty in the twenty-four hours. The temperature was 99°, the pulse 120, very weak.

The surface of the skin was covered with a cold, clammy sweat, the eyes were sunken, the tongue moist and clean, the lips blue. There was some cough, but no expectoration. The patient had a very peculiar putrefactive odor. The belly was flat and retracted; there was no pain on pressure, and no dulness. The liver dulness had not further increased.

The patient died April 21st. An autopsy was not allowed.

This case was apparently a hopeless one on admission to the hospital. It is undoubtedly to be classed with those of the gangrenous variety of this form of dysentery. From the epigastric pain and the hepatic enlargement present, it is not improbable that there was abscess of the liver. As an autopsy was not allowed, it is to be regretted that the liver was not explored with the aspirating needle after death.

CASE II occurred in the service of Professor S. K. Merrick, at the Maryland General Hospital during June, 1892. The patient had been under the care of Dr. Charles H. Rose, of Cordova, Md., who has kindly furnished us the following facts concerning his previous history and an account of the patient while under his observation:

J. W. W., twenty-seven years of age, single, of a nervous temperament, and sedentary habits. The family history is good. The patient is a telegraph-operator, and smokes cigarettes to excess; he weighs, in health, about 120 pounds. He has suffered with chronic constipation for some years. Except for this he always had good health until the winter of 1891, when he had blood-poisoning, following a blow in the face, received while living at Hadley, Delaware. From this he fully recovered; but two months later he was again under Dr. Rose's

care with a severe attack of influenza, which was followed by acute rheumatism. He was not able to return to work till October, 1891. In February, 1892, he was again seen by Dr. Rose, and was then complaining of constipation, general malaise, and irregular fever. There was loss of appetite, a yellow tint to the conjunctiva, and emaciation. He gradually became worse, and during May had chills, followed by high fever and profuse sweating. For some time there had been a troublesome cough, accompanied by copious expectoration.

The following is furnished me by Professor Merrick: On admission to the hospital the patient was emaciated, the skin of a sallow hue; there was a harassing cough, with copious expectoration. The morning temperature was 100° F., the evening temperature 103°, followed by very profuse night-sweats. The pulse was 110, the respirations 28. The ribs were prominent, the expansion good, except at the right base posteriorly. There was a localized bulging of the chest on the right side posteriorly, extending from the inferior angle of the scapula to the extreme base, and from 5 cm. to the right of the spine to a point 2 cm. outside the posterior axillary line. Mensuration showed this side of the chest to be 15 mm. larger than the left side. Over this area there was absolute percussion-dulness, approaching flatness. The lungs were clear to percussion elsewhere. On auscultation over the area of dulness the vesicular murmur was either distant or absent. Tactile and vocal fremitus were lost here. Both lungs were clear elsewhere. These signs, together with the copious expectoration of a thick, glairy muco-purulent sputum, were thought to indicate the presence of an empyema that had broken into a bronchus. The introduction of a moderate-sized aspirating needle

was not followed by the flow of any fluid. The liverdulness was not increased anteriorly, and air entered the lung from apex to base in front. The lower border of the liver was not palpable. The spleen and abdomen were negative.

Thinking that the process was probably tuberculous, Professor Merrick sent us a specimen of the sputum for microscopic examination.

Before examining the sputum we knew nothing of the history of the case or of the physical signs present. The specimen when examined was twenty-four hours old. In general appearance the sputum was somewhat frothy, of a grayish color, and contained numerous grayish nummular lumps. There were no reddish streaks or other sign of hemorrhage. Cover-slip preparations were made, and after drying, stained in the usual way with carbol fuchsin, and decolorized with a solution of sulphuric acid containing methylene-blue, thus counterstaining the nuclei. After careful examination of six preparations no tubercle-bacilli were found.

But at first glance my attention was drawn to a great number of very large cells present. These cells were considerably larger than the ordinary alveolar epithelial cells so often seen in the sputum. Some of these cells appeared to contain irregular and degenerated nuclei. There were also large numbers of pus-cells and a considerable number of what appeared to be alveolar epithelial cells. In order the better to study the large cells referred to, unstained cover-slip preparations of the sputum were made. In these there appeared large numbers of these cells. In size they varied from three to five times the size of an ordinary leukocyte, and were in general round or oval in outline; some were irregular in shape.

Their appearance was usually homogeneous and

colorless, sometimes finely granular. Some contained fine granular detritus and fine fat-globules; and a few appeared to contain degenerated nuclei, suggestive of the nuclei of pus-cells. In some there were bacteria; no definite nucleus was made out. These bodies differed from the alveolar epithelial cells present in that the latter were smaller and had the typical nuclei. The large cells described were not seen to move. Nevertheless, we were convinced that they could be nothing else than amebæ. As the specimen was twenty-four hours old, the fact that the bodies did not move did not militate against the idea of their being amebæ.

We obtained from the hospital a freshly expectorated specimen of sputum. Unstained cover-slip preparations of this showed large numbers of actively moving amebæ, some being very much more active than others. They were very much more numerous than the other cells present, there being three or four in a single field. They varied much in shape; some being round, some oval or oblong, and still others, especially the actively moving forms, very irregular in outline. There were many in active motion, sending out pseudopodia with great frequency and rapidity, causing such a rapid change of shape that it was impossible to draw them. The central portion of the amebæ contained vacuoles, finely granular material, and often fine fat drops and bacteria, and in some there were the nuclei of leukocytes. The pseudopodia presented a homogeneous, translucent, steel-gray appearance. A more or less well-marked endosarc and ectosarc could be made out. The sputum also contained many pus-cells, numerous alveolar epithelial cells, and some elastic tissue fibers. No liver-cells were recognized in the specimens examined.

Although we had no knowledge of the history of the case or of the physical signs present, we felt warranted in stating in our report to Dr. Merrick that the patient had an amebic abscess of the lung, and in suggesting that it was probably a hepato-pulmonary abscess. Professor Merrick invited us to see the case with him the next day, and after going over it carefully we agreed that there was no doubt but that the patient had a hepato-pulmonary abscess associated with the presence of the ameba coli.

Careful questioning of the patient brought out the fact that some time previously he had had an attack of dysentery from which recovery was slow, but that for the last six months his stools had been normal. He also stated that in March last, after a severe attack of coughing and dyspnea, he coughed up over a quart of thick creamy pus. During the whole time of his stay in the hospital his stools were well formed, normal in appearance and free from mucus and blood.

The patient was also seen by Professor Robert W. Johnson, who advised against operation. Quite a large aspirating needle was afterward introduced into the dull area, but no fluid escaped through it. The lumen of the needle, however, contained a single drop of thick, creamy, gelatinous-looking pus, which on microscopic examination showed numerous actively moving amebæ. The patient was in the hospital under observation for one month, when he returned home, where he died in the middle of August last. An autopsy was not allowed.

Councilman and Lafleur¹ divide cases of amebic dysentery into three clinical groups: (1) dysentery

¹ Loc cit., p. 453.

of moderate intensity ; (2) grave or gangrenous dysentery ; and (3) chronic dysentery.

According to them, cases of the first variety show muscular weakness, pallor, indifferent decubitus, dull expression of the face, dryness and inelasticity of the skin, and a pale and flabby tongue. The temperature is often normal, not usually going above 100° F.; the pulse ranges from 70 to 90 per minute ; and the respirations from 18 to 30. The appetite is impaired and the sleep is disturbed by more or less frequent stools.

In the grave or gangrenous variety they state that the face is drawn, slightly cyanosed or flushed, the expression anxious, and the mind usually clear. There is complete anorexia and intense thirst, the abdomen is greatly retracted, and there may be profuse sweating. The temperature is frequently normal or even subnormal, the pulse is rapid, the respirations accelerated. In the chronic form there is progressive anemia and marked loss of flesh.

The diarrhea is the principal symptom of the disease, and it is subject to great variations in character and frequency. Councilman and Lafleur¹ call particular attention to the irregular intermissions and exacerbations to which it is subject. As pointed out by them, the exacerbations may occur at any period of the disease, and may come and go suddenly, lasting from a day to a week or ten days. They lay especial stress upon the intermissions, which may last from a day to three weeks or longer, during which time the feces are soft or even well formed, but usually have mucus adherent to them ;

¹ Loc. cit., pp. 456-7.

and they draw attention to the fact that these exacerbations and intermissions are most marked in cases complicated by abscess of the liver.

The stools vary in number and amount within wide limits. In our first case there were as many as thirty in twenty-four hours; but this is unusual. The amebæ are found, however, in the stools in all three forms of the disease. As was first shown by Lafleur,¹ they are most numerous in the small gelatinous masses in the stools. The appearances described in Case I may be taken as a type of the characters usually met with in this form of dysentery. As is shown in this case, the stools contain, on microscopic examination, besides the amebæ, red blood-corpuscles, pus-cells, columnar epithelial cells, bacteria of various kinds, elastic tissue, and even unstriped muscle-tissue, granular detritus, and undigested food; there are also large oval epithelioid cells which may be mistaken for amebæ.

The character of the sputum in these cases has been sufficiently dwelt upon in the report of our second case.

The stools of patients suffering with dysentery or diarrhea should be examined, especially in hospitals, as routine practice. Councilman and Lafleur failed to find the ameba coli in the stools of patients with catarrhal and diphtheritic dysentery, and from their observations it would seem that these organisms are found in the stools only in the ulcerative or so-called tropical dysentery. A matter, however, of great importance is the question of what proportion the frequency of the occurrence of

¹ Lafleur: Johns Hopkins Hospital Bulletin, vol. i, 1890.

this last form of dysentery bears to that of the other two.

This can be determined only by the examination of the stools of a large number of patients with these several forms of dysentery. No one, however large his experience, can be certain that a given case of dysentery is due to the ameba coli until microscopic examination of the stools is made.

The clinical value of the differentiation of this form of dysentery from the other forms lies of course in the important bearing that this has upon the questions of diagnosis and treatment. For this reason, particularly in cases of chronic diarrhea, especially if it is of a remittent character, a careful study of the stools is important. It is in these that mistakes are most likely to be made. As this disease, whether acute or chronic, is a grave affection, and as the complications and the final outcome in a given case cannot be foreseen, it is necessarily a more serious disorder than the other forms of dysentery. Experience has shown that the chronic variety is more likely to be followed by complications than the acute.

The most important and the most fatal complication is the formation of liver-abscesses, which, when situated on or near the upper surface of the right lobe—and this is a favorite seat—often perforate the diaphragm and involve the lower lobe of the right lung. In this event there is a hepatopulmonary abscess. Pus from this is usually sooner or later discharged through a bronchus. Liver-abscess occurred in eight out of the fifteen cases

reported by Councilman and Lafleur,¹ and in four of these there was subsequent involvement of the lower lobe of the right lung. Of these fifteen cases, ten were acute, and of these acute cases three were complicated by liver-abscess. In all five of the chronic cases there was liver-abscess, and in four of these the lower lobe of the right lung was involved. In only one of the acute cases did this occur.

Stengel² reports four acute cases, and in none of these was there liver-abscess. Eichberg³ reported one case of the chronic form with hepato-pulmonary abscess, followed by death after operation. The ten cases reported by Dock we have not had access to. Our second case, without doubt, had hepato-pulmonary abscess; in our first case it is uncertain whether or not the liver was involved. At any rate, it is a striking fact that, including our own cases, of the seventeen cases reported from Baltimore nine had liver-abscess, and of these last there were five cases of hepato-pulmonary abscess.

In a case of dysentery in which the ameba coli has been found in the stools, whether the process is acute or chronic, one is, of course, on the lookout for involvement of the liver, and this is early suspected if not definitely recognized. But given a case of localized dulness at the base of the right lung, either in front or behind, with loss or absence of the vesicular murmur, with or without discoverable enlargement of the liver, and with the presence of copious muco-purulent and slightly blood-tinged expectoration, careful inquiry should be made to

¹ Loc. cit., p. 490.

² Loc. cit.

³ Loc. cit.

find out if there is not a history of diarrhea. The microscopic examination of the sputum in such a case will settle the diagnosis.

The prognosis of these cases is, of course, grave. Of the six American cases of hepato-pulmonary abscess proved to be of amebic origin that we have referred to, five died while under observation and one (Councilman and Lafleur, Case IX) recovered.

A diminution in the number of amebæ present in the discharges, or their total disappearance, is usually to be taken as a good omen. The same is to be said of finding dead amebæ in discharges that have previously contained only the actively moving forms.

An interesting and suggestive observation has lately been made in this connection by Flexner,¹ who found active amebæ not to be distinguished morphologically from the ameba coli in the pus of a cervical abscess following necrosis of the lower maxilla.

Discharges suspected of containing amebæ coli, whether from the bowel or from lung or liver abscesses, should be received in a covered receptacle, preferably warmed, put in a warm place and examined as soon as possible. It should be remembered that exposure to cold renders the movements of the amebæ sluggish or causes them to cease altogether. Often careful warming of the slide over the Bunsen flame will cause sluggishly-moving or even motionless amebæ to show active motility. This procedure is often of great assistance in doubtful

¹ Flexner: Johns Hopkins Hospital Bulletin, vol. iii, No. 25, 1892.

cases. For detailed study of the organisms the warm stage should be used.

In doubtful cases of liver-abscess or lung-abscess it is usually justifiable to explore with the aspirating needle. As the pus in these abscesses is often too thick and tenacious to flow through the needle, even when strong pressure is used, the lumen of the sharp end of the needle should always be carefully examined. In this way, even when pus fails to flow through the needle, enough may be obtained to demonstrate the presence of amebæ, and thus a positive diagnosis can be made.

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